

HOW TO SHARPEN

for the
HOME CRAFTSMAN
MECHANIC
FARMER

ELLIOTT'S HARDWARE
2951 DUNDAS W.
TORONTO 9, ONT.
RO. 7-3186



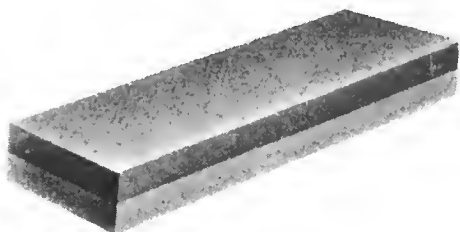
BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY



SHARPENING STONES for the SHOP

Pictured here and on the last page of this booklet, are a variety of NORTON ABRASIVES Sharpening Stones in many sizes, shapes and grits. The stones are all standard. Your hardware dealer has them or can get them for you.



Popular CRYSTOLON® Bench Stones

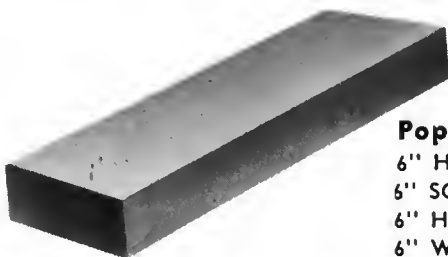
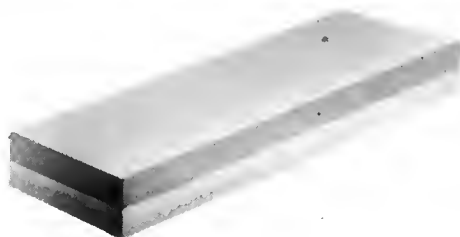
6" Single Grit—Medium MJB-6

6" Combination Grit—Coarse and Fine Grits JB-6

Popular INDIA® Bench Stones

6" Single Grit—Medium MB-6

6" Combination Grit—Coarse and Fine Grits JB-6



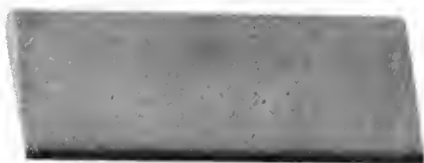
Popular Natural Bench Stones

6" HARD ARKANSAS* Single Grit HB-6

6" SOFT ARKANSAS* Single Grit SB-6

6" HARD ARKANSAS Mounted, Single Grit HM-6

6" WASHITA* Single Grit WB-6



ROUND EDGE SLIPS

5" INDIA Medium Grit MS-15

5" CRYSTOLON Medium Grit MJS-15



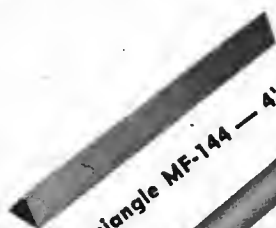
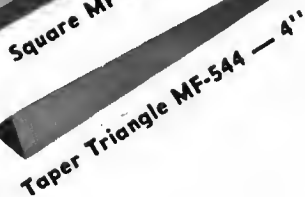
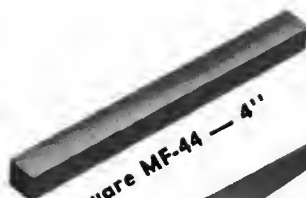
INDIA

Special Gouge Slip

FS-76—Fine grit only—6"

INDIA Files and Shapes

Medium Grit



HOW TO SHARPEN

**A book for the
home craftsman,
farmer, mechanic,
and others who
use edged tools**

First Edition Published 1912

Thirty-sixth Revised Edition 1959

"A cutting tool is no better than its edge"

C O N T E N T S

FUNDAMENTALS OF SHARPENING

| | |
|--------------------------|-------------|
| What Is Sharpening..... | 3 |
| Bevels | 9, 10 |
| Edges | 6, 7, 8, 10 |
| Oil for Oilstones..... | 5 |
| Stones, Descriptions of: | |
| Natural | 5 |
| Electric Furnace | 4 |

HOW TO SHARPEN:

| | |
|-----------------------------|-----------|
| Garden and Farm Tools | 16 |
| Household Cutlery | 14 |
| Sporting Equipment | 15 |
| Woodworking Tools | 8 thru 13 |

WHAT is SHARPENING

For illustration let's take a typical edge as on a plane blade or chisel. By magnifying it greatly, we can see what it look like when dull, and what happens to it in the stages of sharpening.

Figure 1

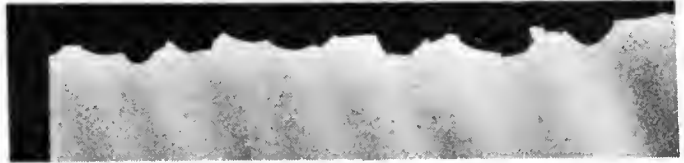


Figure 1 illustrates a cutting edge that has broken down or worn off and which also has been chipped by accident. While it could still be used, this edge would really tear rather than cut.

Figure 2

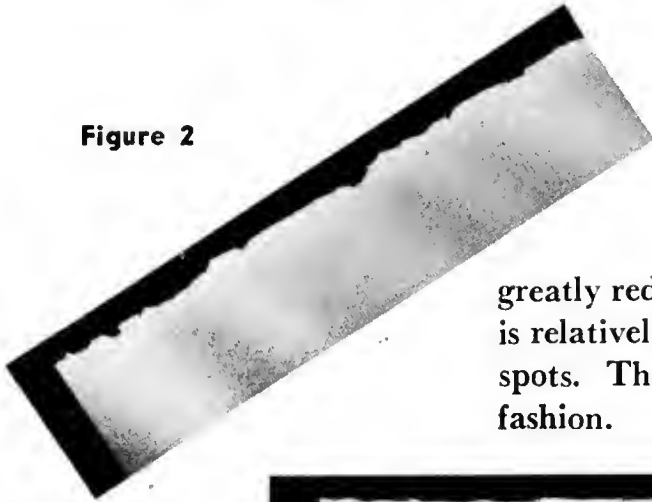


Figure 2 shows the edge after the first stage of sharpening, on a coarse stone. Here, we see that the hills and valleys are greatly reduced and we have a tool that is relatively sharp—but only in the high spots. This edge would cut after a fashion.



Figure 3

Now look at Figure 3, made after the final stoning on a hard fine stone. Here is a truly sharp edge that will do beautiful work with ease. The important thing to remember is that in spite of its excellence, this edge is easy to produce and maintain.

FACTORS in SHARPENING

The material elements in sharpening are three — the stone or stones, the lubricant used, the quality of the tool. An understanding of these few basic factors will greatly aid in their effective application.

STONES

There are two classes of stones, both important in sharpening. These are electric-furnace manufactured stones, and natural stones. The grit of manufactured stones is actually harder than anything in nature except diamond. These stones are valuable for their fast-cutting qualities, enabling them to take off metal quickly. Many such NORTON ABRASIVES stones give you the added exclusive advantage of being oil-filled at the factory.



CRYSTOLON®, a NORTON Abrasives stone which you may see in most hardware stores, is of Silicon Carbide grit made in an electric furnace, crushed and graded to various degrees of fineness and scientifically bonded in many forms.

INDIA®, another NORTON electric-furnace product, is of Aluminum Oxide grit, a reproduction of the natural mineral Corundum, which is closely related to the ruby and sapphire. The crystals are vitrified together in forms adaptable to all shop requirements from the combination bench stone to small "slips" of various shapes. INDIA stones have long been favorites for precision sharpening.

NATURAL STONES are quarried and supplied in their various forms just as nature made them. Their principal characteristic is extreme density and hardness invaluable for extremely fine edges. Some craftsmen use Natural stones for finishing an edge already given a preliminary sharpening with the coarser INDIA or CRYSTOLON stones.

HARD ARKANSAS* is supreme for finish stoning of the very finest tools, such as used by surgeons, dentists, engravers, wood and ivory carvers, etc. Of all stones, Natural or Manufactured, it imparts the finest edge. **HARD ARKANSAS** is found only in the Ozark Mountains, and while its rarity makes its cost comparatively high, its extreme hardness makes it a life-time tool, requiring no replacement.

SOFT ARKANSAS* is not quite as hard as **HARD ARKANSAS**, is more porous and is quicker cutting. Its qualities make it a favorite for finish stoning with carpenters and others who use woodworking tools, to which it imparts an edge fully adequate to the carpenter's needs.

WASHITA* is a natural stone that is softer and quicker cutting than **SOFT ARKANSAS**, and has long been popular for quickly producing an edge of good medium fineness.

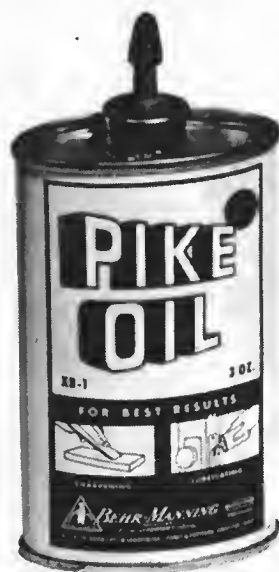
Other stones in the **NORTON** Abrasives line are **QUEER CREEK®**, a natural benchstone for woodworking tools, and **QUICKCUT***, a fabricated stone made in several forms for use in home, farm and shop.

* Trade Mark

LUBRICATION

There are three good reasons for using oil on sharpening stones. First, you do a faster sharpening job. Second, you get a finer edge, and third, you prevent clogging or loading of the stone with metal chips. A very light, free-flowing non-gumming oil is needed, which will flush off the small metal chips and clear the cutting edges of the abrasive grit.

PIKE Oil is recommended for all sharpening operations. It is a natural mineral oil highly refined under U. S. Pharmacopoeia specifications. Illustrated is XB-1.



An EDGE should be

An edge that is right for one purpose can be wrong for another. One difference is in the angle of bevel, another difference is in the relative fineness of the edge. Both of these points are graphically presented in the drawings below, representing typical tools from the razor to the axe.

In every tool there are two angles of bevel to be considered. For the purpose of illustration let us call these (1) "edge bevel" and (2) "blade bevel," meaning that part back of the edge. It is "edge bevel" that concerns us most, since in most tools and knives the "blade bevel" is fixed, and is seldom touched in sharpening. An exception, however, is in the plane or chisel blade, the "blade bevel" of which must occasionally be applied to the stone.



The **RAZOR** is illustrated only for purposes of comparison with other tools, since the honing of a razor is a distinctly professional job. The "blade bevel," formed by hollow grinding, makes the blade very thin, the sides almost parallel. Note the very acute angle of the edge bevel. Obviously an edge like this, while ideal for its purpose, would never survive any other use. Note, too; the fineness of the edge compared with the kitchen knife.



The **POCKET KNIFE** is truly a general purpose cutting tool. Its edge must be sturdy, and thus the edge bevel should not be too acute. An angle of about 25 degrees will serve most purposes. The pocket knife is one tool in which the edge bevel only is touched in sharpening, the blade bevel, or flat of the blade, being left as the manufacturer designed it.



The **CARVING KNIFE**, with a flat or hollow ground blade, is similar in bevel of edge to the pocket knife; but for its purpose an edge not quite so fine is desirable since in effect the carving knife actually saws through the meat.

FITTED TO ITS JOB

The **KITCHEN KNIFE** is another all-purpose cutting tool, usually put to rather rough usage. In consequence a comparatively obtuse edge bevel will stand up best, and a definitely coarse edge finish, easily and quickly renewed, is most serviceable.



The **WOOD CHISEL** is representative of most woodworking tools in edge bevel and edge finish. The usual blade bevel of the chisel is at an angle of about 25 degrees, and the edge bevel only slightly more. A fine edge quality is most desirable on all woodworking tools.



The **AXE** is nothing more than a heavy wedge. To give it an acute edge bevel would merely cause it to stick in the wood at every stroke. Thus it is decidedly obtuse in both edge and blade bevel, so that in use it splits off the chips and frees itself easily for the next stroke.

The quality of the edge, however, is as fine as the user cares to make it. Maine guides have been known to keep their axes so sharp that they could actually shave with them. In any case, the sharp axe is safest to use, as a dull blade can glance off the wood and cause injury. This applies, in fact, to practically all edged tools.



RELATIVE FINENESS OF EDGE FINISH



RAZOR



**POCKET KNIFE
WOOD CHISEL
AXE - ICE SKATE**



CARVING KNIFE



KITCHEN KNIFE

SHARPENING WOODWORKING TOOLS

The **PLANE AND OTHER CHISEL-TYPE TOOLS** are as representative an example of all sharpening procedure as one can find. In the pages immediately following, the sharpening of a plane blade will be covered in complete details, so that the principles established may be applied as a general basis to the sharpening of all edged tools.

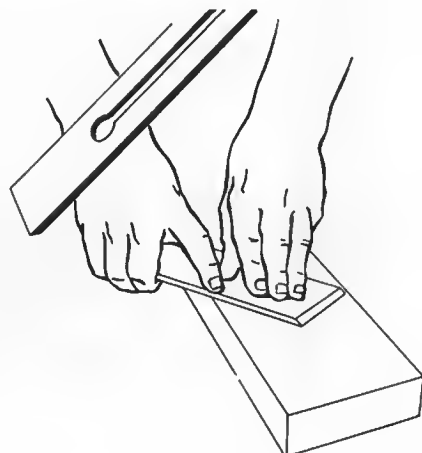
For sharpening equipment you will need a can of **PIKE OIL** and a bench stone such as **CRYSTOLON Combination** or **INDIA Combination** which has a course and fine face. For final stoning on very fine edges a small **HARD** or **SOFT ARKANSAS** stone is desirable.



The EDGE MUST BE ALMOST SQUARE so that the blade will not tend to work out of true in the plane. If the edge needs truing, take it off as needed, and holding the blade vertically on the face of the stone, pass it back and forth without changing its vertical position, while bearing down hardest on the side that needs to be taken down.

The FACE OF THE BLADE MUST BE ABSOLUTELY FLAT to have a true cutting edge.

Every depression in the face of the blade will cause a corresponding dip in the edge where the bevel meets the face. To get a true flat finish, simply hold the plane blade face down against the fine side of your stone and, without rocking it, give it a long oval movement flat on the stone, with equal pressure all over. Use plenty of oil.



GETTING THE RIGHT BEVEL

Once the face of the plane iron is flat and free from tool marks, you should then establish the angle of blade bevel. This angle will vary with different planes. However, the angle should not be greater than necessary to clear the work, as the removal of too much metal will leave the edge with insufficient support.

First thing to do is to take down the blade bevel to a point shown in Fig. 1—all the way to the face of the blade. The coarse side of your stone should be used until the bevel is down almost to a point where it meets the face of the blade. Finish the blade bevel with a few strokes on the fine side of the stone.

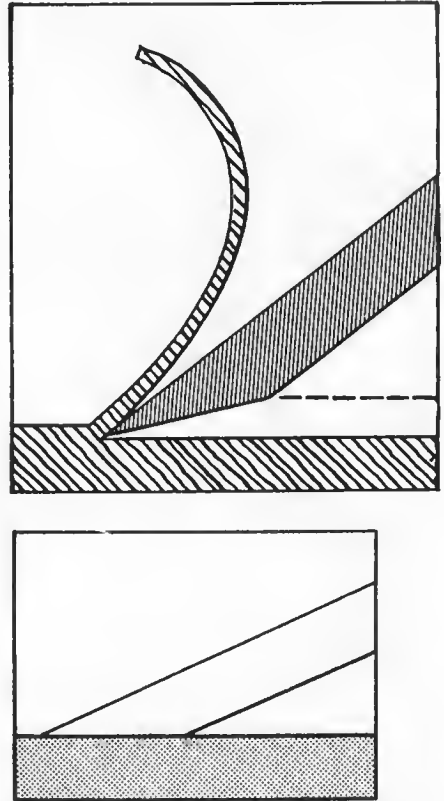


Fig. 1

To stone the bevel of a plane iron without rounding it, or changing the angle, is not as difficult as it may appear.

As shown in the photo, one hand controls the angle at which the blade is held, the other supplies downward pressure on the blade. Hold the wrists rigid and move the blade across the stone in a continuous "figure 8" pattern. If the wrists are kept rigid, the angle of the blade on the stone cannot change appreciably.

Some experts use a long oval movement instead of the "figure 8". In any case the motion is continuous, and not a "stop and start," back and forth movement, which is tiring as well as more likely to change the angle of bevel.



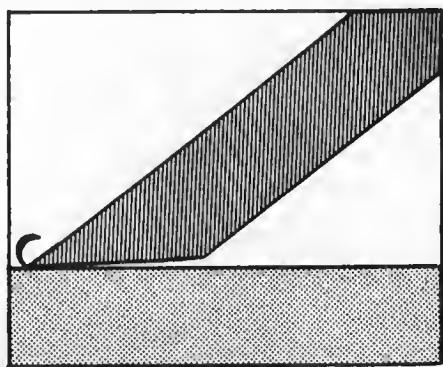


Fig. 1

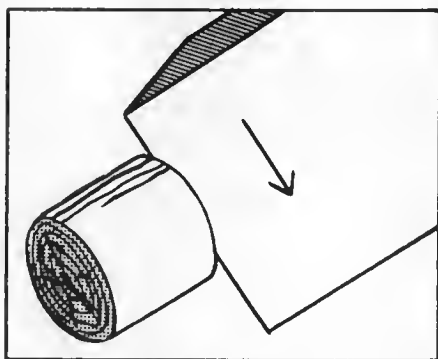


Fig. 2

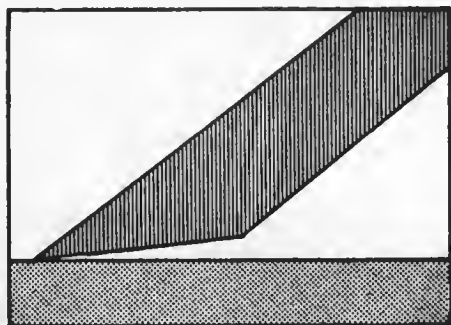


Fig. 3

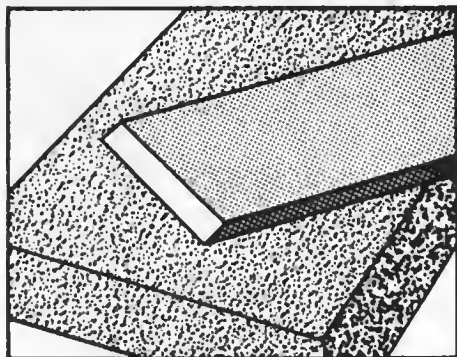


Fig. 4

REMOVING THE WIRE EDGE

The wire edge is the very edge of the blade which has become stoned down so far that it bends away from the stone instead of remaining rigid and being stoned off. Fig. 1.

It is important that the wire edge be removed carefully. The best and easiest way is to run the blade across a piece of hard wood once or twice, which will break it off. Fig. 2.

Stoning the Edge Bevel

This is the final operation. Using the fine side of the stone, place the bevel so that the heel is raised slightly as in Fig. 3, and holding the blade rigidly, stroke it in the "figure 8" movement previously described. Occasionally reverse the blade and lightly stone the face, holding it absolutely flat. Fig. 4.

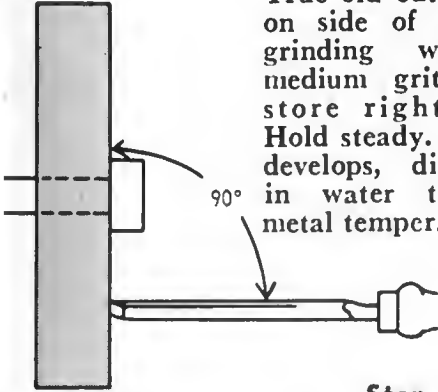
For most tools the fine side of a CRYSTOLON or INDIA Stone will give an edge of satisfactory fineness. If you wish to go beyond this to an even finer edge then finish off on a HARD ARKANSAS Stone.

GOUGE

This is one of the curved edge tools that requires a stone formed to fit the curve of its edge. INDIA Gouge Slip FS-76 is recommended after any necessary grinding.

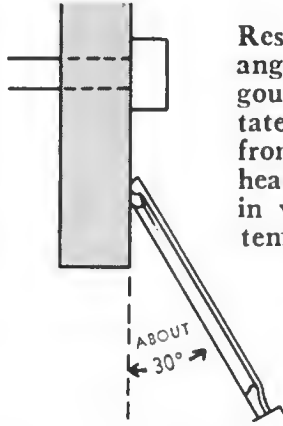
Step 1

True old cutting edge on side of revolving grinding wheel of medium grit, to restore right angle. Hold steady. As heat develops, dip gouge in water to retain metal temper.



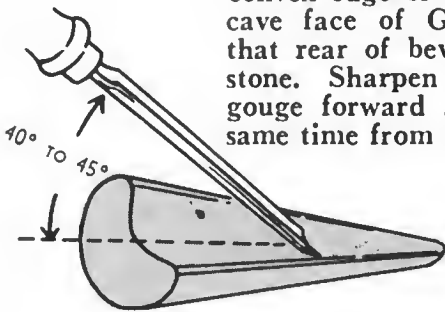
Step 2

Restore original bevel angle as established by gouge manufacturer. Rotate gouge at steady rate from point to point. As heat develops, dip gouge in water to retain metal temper.



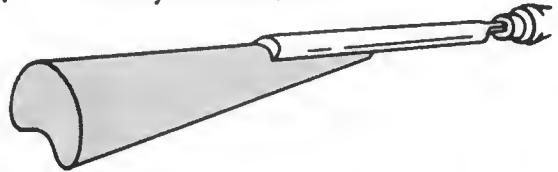
Step 3

Set new cutting angle with INDIA Gouge Slip. Apply convex edge of gouge to concave face of Gouge Slip so that rear of bevel is clear of stone. Sharpen by pushing gouge forward and rotate at same time from point to point.



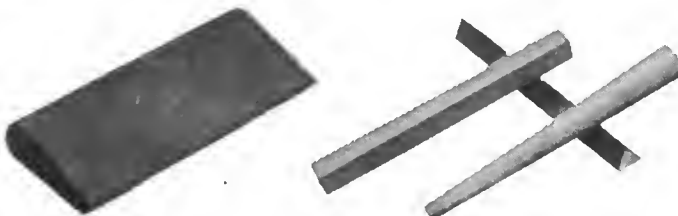
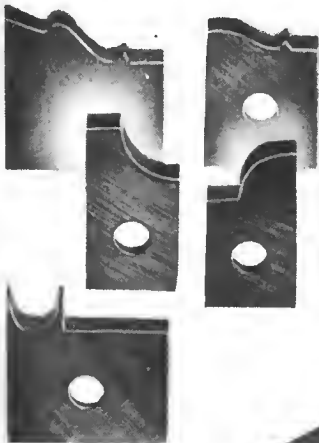
Step 4

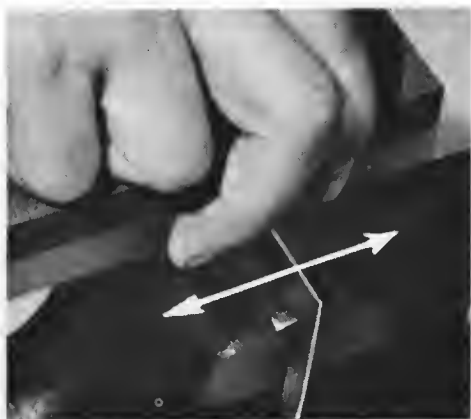
Deburr new cutting edge by placing concave face of gouge flat on convex face of INDIA Gouge Slip. Rub gently back and forth. This breaks off the fine "wire edge" that develops with each new stoning. The gouge should now be ready for use.



SPECIALLY FORMED PLANE CUTTERS

In the case of shaped moulding cutters, edges otherwise difficult to reach, may be easily sharpened with an INDIA Gouge Slip as shown above, with INDIA Round Edge Slips, or with INDIA Files which are available in many shapes in Coarse, Medium, and Fine grits.





SCRAPER

It is best to hold the blade in a vise, then use a Bench Stone on the bevel, first the coarse and then the fine side. Take off the wire edge against a piece of hard wood, and give it the final stoning to a fine edge. Then turn the edge of the bevel downward by burnishing with a piece of hard, smooth steel, or the burnishing tool.



DRAW KNIFE

Hold the drawknife by its handles at the correct angle to the surface of the stone, and draw it across diagonally so that all parts of the edge are equally stoned. Except for this diagonal motion and the method of holding the tool, the procedure is the same as with a plane iron.



POCKET KNIFE

Pocket Stones are recommended for pocket knives. For general use, a good selection is CRYSTOLON Pocket Stone JP-13 or JP-14. Put a few drops of PIKE Oil on the stone. Hold the stone by one end on the corner of a flat surface. Place the blade flat on the stone in a diagonal position. Now tip the back of blade up about 25° . Draw the blade against the surface diagonally the length of the stone, beginning at the heel and ending at the tip. Flop blade to other side and repeat the operation from opposite end. Continue this action until sufficiently sharp.



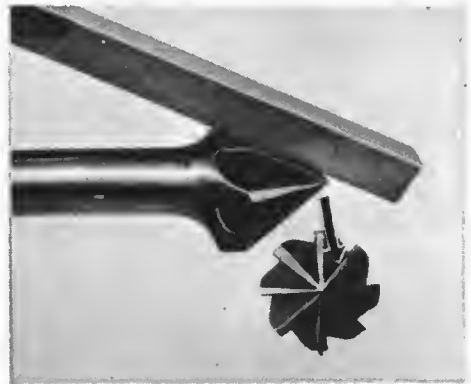
AUGER BIT

Use an INDIA Auger Bit Stone MT-10 as illustrated, and stone the upper side of the cutting edges, being careful to retain the original bevel angle as closely as possible. Stone the lower side of the bevel only enough to remove any burr. Then stone the spurs which score the wood in advance of the cutting edges, working on the inside of the bit only.



COUNTERSINK

A worn or nicked countersink can be restored to usefulness by stoning the face of the cutting edges. Use a fine INDIA File of the useful triangular shape, as MF-146 or similar.



HATCHET

If the hatchet has a curved edge, while moving the blade from end to end of the stone, rock it so that all parts of the edge will get equal stoning. In the case of a straight edge hatchet this rocking motion is of course not required. In the hands of some experts, the hatchet is a precision hand tool. Its edge can be given chisel fineness, with a fairly acute bevel.





KITCHEN KNIVES

Designed for the housewife, CRYSTOLON Knife Sharpener 273-A is ideal for kitchen knives. Hold knife near edge of flat surface, cutting edge up. Set stone against cutting edge at an obtuse angle. Revolve stone against edge in small circular motions from heel to tip of blade. Repeat on other side.



CARVING KNIFE

Carving knives and slicers require the type of edge produced with KANT-BREAK Knife Sharpener KPT-2. Hold stone steady in one hand, and with the other, draw cutting edge of knife in long sweeping motions against the stone diagonally from heel to tip, first one side, then the other.



SMALL CUTLERY

Small knives are best sharpened with CRYSTOLON Handy Sharpener JT-6. Hold stone steady in one hand, and with the other, move cutting edge of blade diagonally from one end of stone to the other. Sharpen from heel of blade at one end, finishing with tip at other end. Repeat on other side.



SCISSORS - SHEARS

INDIA Combination Bench Stone, as IB-6, is excellent for scissors and shears. Place stone near edge of flat surface so that one blade hangs clear. Grasp shears near middle, and place cutting edge on stone at slight diagonal. Tip blade toward the bevel. Draw cutting edge against stone diagonally the length of the stone. Use Coarse side first, then Fine side..

WOODMAN'S AXE

This is a fine tool, designed for strength and lightness. It requires a keen edge. The answer is the CRYSTOLON Combination Axe Stone, combining coarse and fine sides. Carefully maintain the correct bevel — a fairly obtuse angle — frequently shifting the axe from one side to the other while stoning. Kerosene or water can be used if oilstone oil is not available.



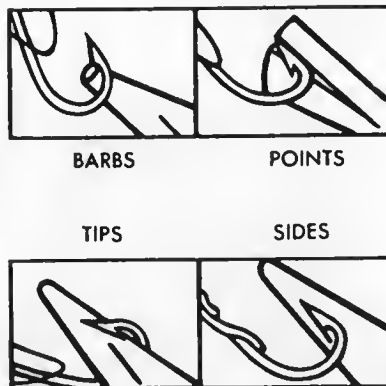
HUNTING KNIFE

This is another tool whose constant effectiveness is vital to the user. The method of sharpening is similar to that used in the case of the pocket knife. The illustrated NORTON Abrasives Sportsman Stone with a plastic case is coarse on one side and fine on the other — a most ideal combination. This is a fine example of a stone whose design exceptionally well meets its need.



FISHHOOKS

The CRYSTOLON Fisherman's Stone JT-30 is tapered and grooved to fit most fish hooks. Sharpening the four parts, barbs, points, tips, and sides, is best illustrated by the four diagrams here, rather than by lengthy description. Use large end of stone for large hooks, and small end for small hooks.





SCYTHE - SICKLE

Sharpen scythes on both sides alternately stroking from heel to tip with a medium-fine scythe-stone. Sickles are similarly stoned except that metal is removed on only one side. Remove burr with stone flat against back.



MACHETE

The CRYSTOLON Combination Axe Stone JT-3 is ideally adapted to sharpening these big blades. Holding the machete steady on a firm surface stone both edges with circular strokes from heel to tip. A medium-fine edge is best.



GARDEN SHEARS

Either of two methods is used here. If it isn't practicable to remove the holding bolt to free the blades, stone the edge bevels with an INDIA or CRYSTOLON Slip. If you can spread the blades sufficiently, sharpen the same as household shears (see page 20).



MOWER BLADES

Without removing from the machine, the nicked edges of a mower blade can be quickly sharpened with a few strokes of the CRYSTOLON Utility File. The shape of this stone enables it to reach every part of the bevel from point to gullet.

SHARPENING STONES

for HOME and FARM



CRYSTOLON®

Knife Sharpener

273-A in 6 handle colors—7½"



KANTBREAK*

Knife Sharpener

KPT-2 For kitchen cutlery—15"



CRYSTOLON

Utility File JD-2

For mower blades, spades, shovels—14"

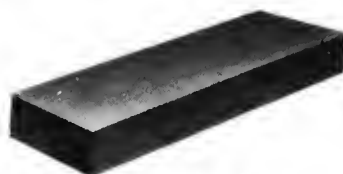
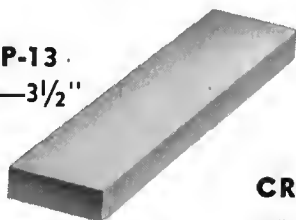


CRYSTOLON

Home and Garden Sharpener

JT-8 For home and garden tools

WASHITA* Pocket Stone WP-13
Best grade Ouachita novaculite—3½"



CRYSTOLON Pocket Stone JP-13
or JP-14 in plastic case



ALUNDUM® Scythestone TD-2

Aluminum oxide abrasive—10"



CRYSTOLON Scythestone TJ-3

Silicon carbide abrasive—10"



SPORTSMAN* Stone JKP-13

Combination Coarse and Fine grits—3"



CRYSTOLON Fish Hook Stone

JT-30 in plastic case—3"

HOW TO SHARPEN

Your success with hand-sharpening problems is the purpose of this booklet. We sincerely hope it will prove of enduring value to you.

Pictured below is the 70-acre BEHR-MANNING Plant where, in addition to housing the sales headquarters of NORTON ABRASIVES Sharpening Stones, we manufacture over 75 miles of Coated Abrasives (sandpaper) daily for industrial production, automotive refinishing, floor sanding, shoe repair, and general home maintenance. We also make pressure-sensitive tapes for masking and strapping.

Your questions or problems on sanding, sharpening, or taping are always welcome, and will receive the prompt attention of this extensive organization. Address Dept. HTS-59.



ELLIOTT'S HARDWARE
2051 DUNDAS W.
TORONTO 9, ONT.
RO. 7-3186



BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY



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